Cleaning National Parks:

Using Environmentally Preferable Janitorial Products at Yellowstone and Grand Teton National Parks

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PURPOSE OF THE PROJECT

The purpose of this project was to help National Park Service janitorial staff and supervisors at Yellowstone and Grand Teton National Parks select and use safer cleaning products. To be selected, the new janitorial products had to meet Park cleaning goals and criteria for environmental preferability developed by the city government of Santa Monica, California.

PROJECT OBJECTIVES

- Eliminate or greatly reduce the use of toxic, hazardous and environmentally harmful cleaning chemicals, and potential human health risks.
- Reduce the quantity and variety of cleaning products by consolidating and standardizing product purchases.
- Choose the safest and "greenest" janitorial products with a proven record in commercial operations.
- Involve top management, first line supervisors and janitorial staff in all aspects of this process to ensure long term success.

PURPOSE OF THIS REPORT

This report documents the process that the National Park Service and two consultants used at Yellowstone National Park to introduce environmentally preferable cleaning products. Grand Teton National Park implemented a similar program starting in April, 1999. This case study is intended to help other Federal agencies and private businesses understand how to carry out a "green" cleaning project.

This report identifies the elements crucial to the project's success and discusses next steps to assure that the project is institutionalized. Five appendices contain supplemental material. Appendix A presents reasons why Federal facilities and others should consider environmentally preferable cleaning products. Appendix B contains an ingredient guide and glossary identifying chemicals found in commonly used commercial and consumer cleaning products. Appendix C presents information to consider when reviewing Material Safety Data Sheets (MSDSs) and labels for health and environmental effects of cleaning products. Suggestions are given on evaluating products and setting goals for an environmentally preferable cleaning project. Appendix D contains a description of the environmentally preferable products used by Yellowstone and Grand Teton National Parks. Appendix E contains a copy of the City of Santa Monica, California's 1998 Custodial Product Bid Specifications. The Santa Monica bid specifications can be a good starting point for evaluating cleaning products.

BACKGROUND

YELLOWSTONE NATIONAL PARK

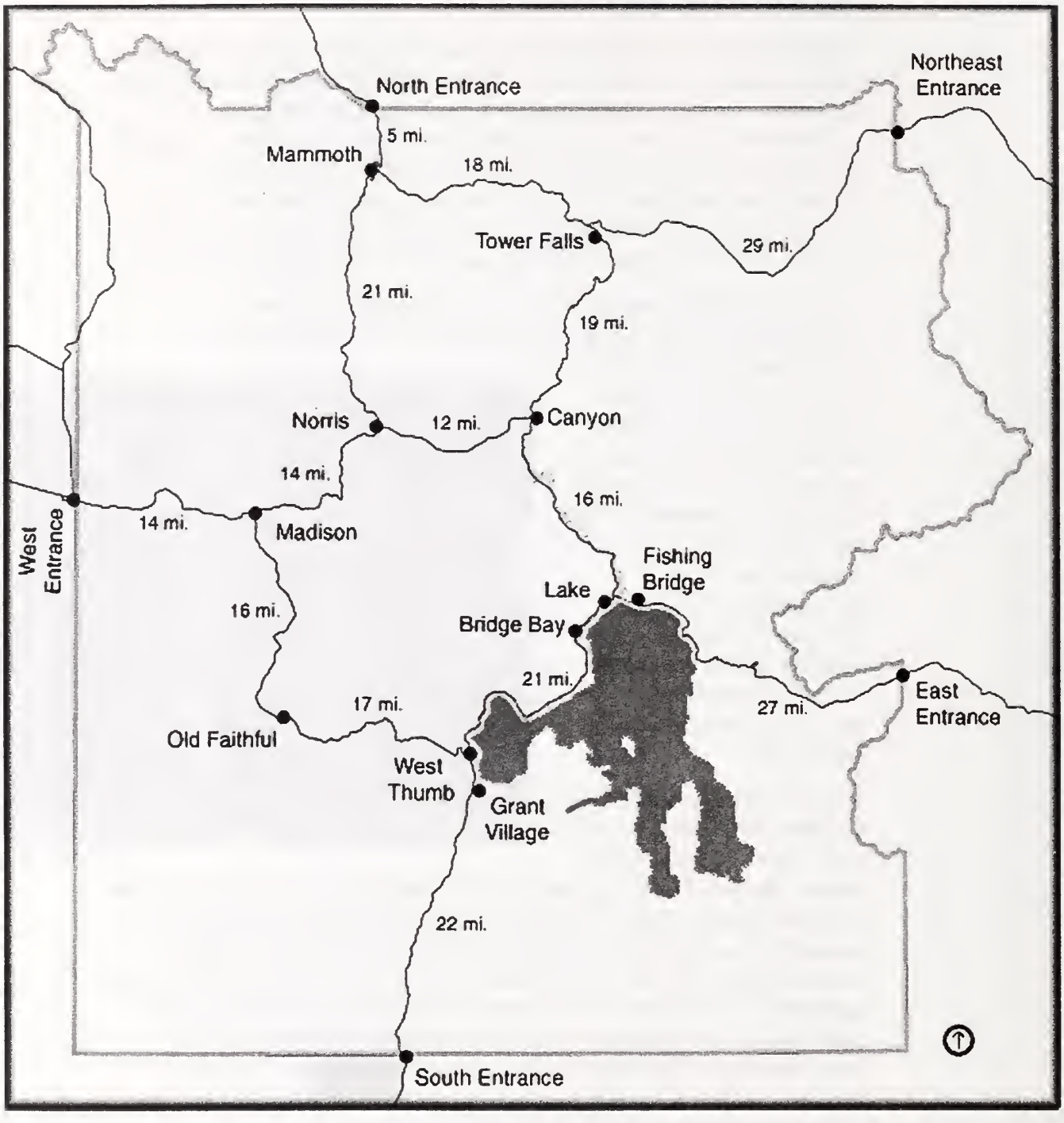
Yellowstone, the world's first national park, encompasses 3,400 square miles or 2.2 million acres. The Park is located primarily in the northwest corner of Wyoming, with portions extending into southwestern Montana and southeastern Idaho. It is open to visitors from mid-April until late October, and in the winter, from mid December to mid-March. About 3 million visitors from all over the world come to Yellowstone each year, mostly during the summer months. The Park Service Headquarters is in Mammoth, Wyoming.

On July 13, 1999, the Director of the National Park Service in Washington, DC, issued a memorandum to all employees on environmental leadership. This letter stated his goal that the Park Service and its partners become leaders among all Federal agencies in pollution prevention and protection of the environment. He specifically mentioned "buying environmentally friendly 'green' products" as one way that Park employees can demonstrate leadership.

American Bison at Yellowstone

Environmental leadership at Yellowstone predates this memorandum by several years. Michael Finley, Yellowstone's Superintendent, was committed to expanding the Park's "greening" role, protecting "the health and security of our visitors and employees and protecting the Park's sensitive environment." The Park began a "Greening of Yellowstone Initiative" in October, 1997, in commemoration of the Park's 125th anniversary. In August, 1998, as part of this initiative, the U.S. Environmental Protection Agency Region 8 Pollution Prevention Program provided funding to two consultants to assist Yellowstone in "greening" their custodial operations.

Through partnerships, Yellowstone has embarked on a variety of other "greening" efforts over the past several years. They include initiatives on areawide composting and recycling, and use of bio-based oils for a truck, snowmobiles and other equipment. Yellowstone employees have made an aggressive effort to educate visitors about their "greening" initiatives. These projects also serve as a model for motels and other businesses in the gateway communities around the Park.



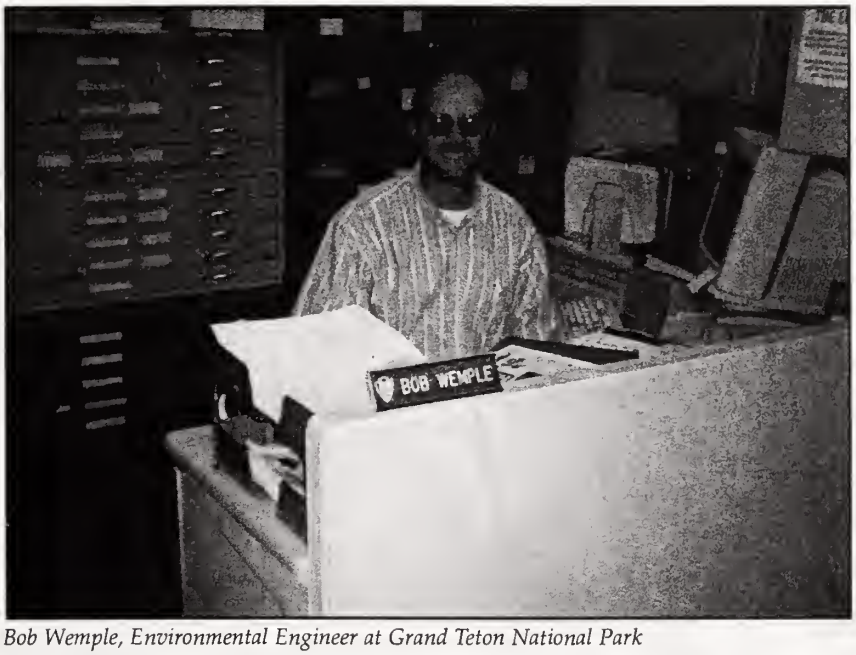
Yellowstone National Park

GRAND TETON NATIONAL PARK

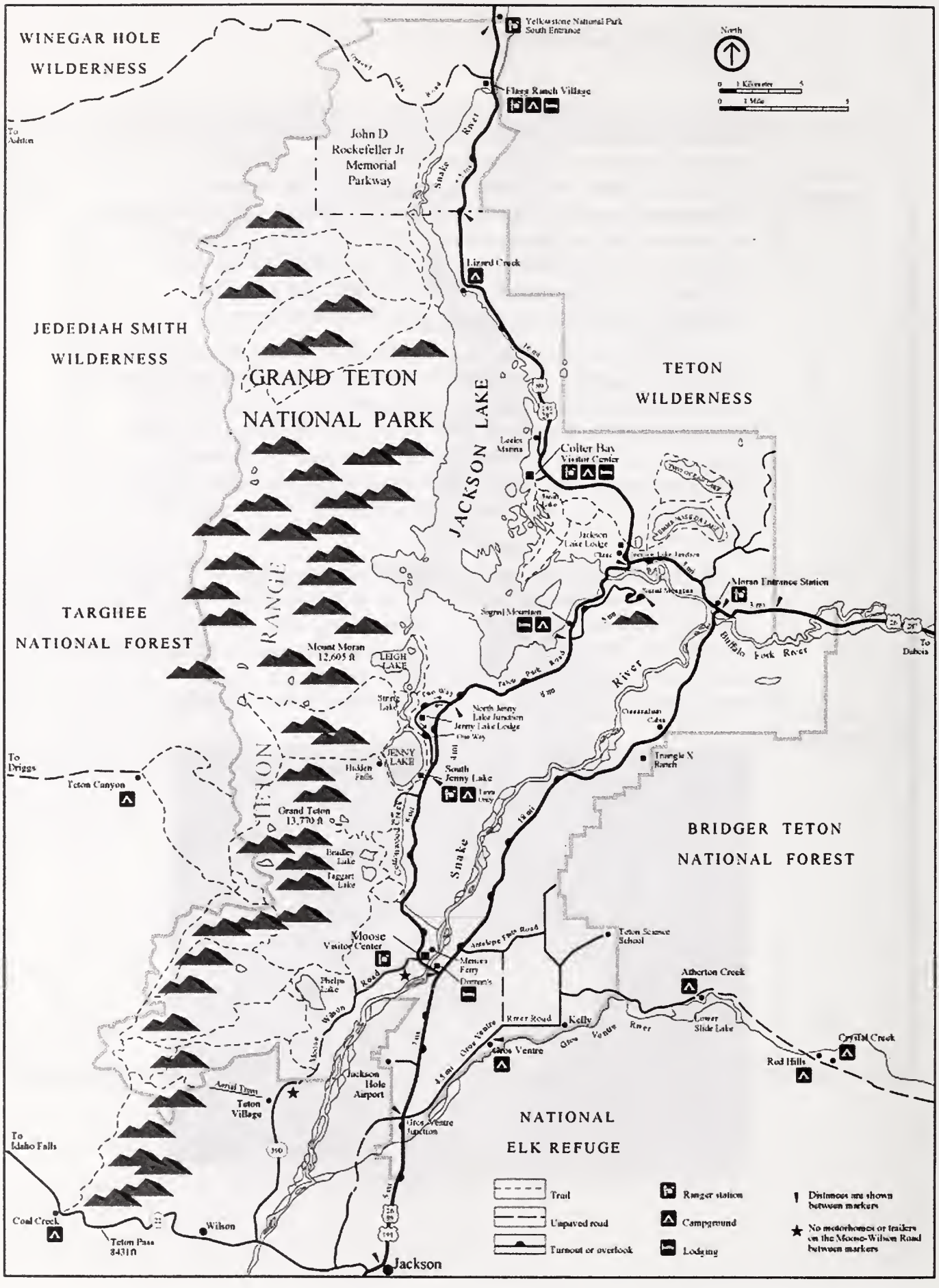
Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway, which are administered together, are located adjacent to the southern boundary of Yellowstone National Park. Including Yellowstone, these three units lie at the heart of the Greater Yellowstone Ecosystem, the largest and most nearly intact ecosystem remaining in the temperate zones of the earth. This makes them important not only to the United States, but to the world. The Headquarters for Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway is in Moose, Wyoming.

Grand Teton National Park was established by Congress in 1929, originally containing about 96,000 acres of the most spectacular part of the Teton Range and the lakes at the base of the peaks. In 1943, President Franklin Roosevelt proclaimed an area of about 223,000 adjacent acres as Jackson Hole National Monument. President Truman signed an act in 1950, combining the Monument and the original park. The present park consists of 309,997 acres, about 485 square miles.

The "greening" of the custodial operations compliments previous pollution prevention efforts in the Park, including elimination of the use of solvents in the auto shop, and recycling used motor oil for heating. The Park is in the process of developing an integrated solid waste and recycling plan. A propane fueling station will be constructed to promote the use of alternative fuels in vehicles.



Bob Wemple, Environmental Engineer at Grand Teton National Park



Grand Teton National Park

CLEANING PRODUCTS

When the average citizen thinks about chemicals in our national parks, cleaning products probably do not come to mind. However, in parks like Yellowstone and Grand Teton, the janitorial staff cleans many different types of buildings, including visitor centers, offices, restrooms, lodging, gift shops, restaurants, campground shower buildings, gas stations, maintenance shops, and medical clinics. Typically, a wide variety of commercial and consumer cleaning products are used.

Many common commercial and consumer cleaning products contain chemicals that, depending on dose and exposure, could be harmful to janitorial employees and chemically sensitive park visitors. Some chemicals in cleaning products can pose physical hazards. For example, they might pose risks if purposely or accidently mixed with other cleaning chemicals. Some chemicals in cleaning products can also have adverse effects on the environment. In high enough doses, some chemicals could increase the biological oxygen demand in surface water or harm sewage treatment plant bacteria. Some chemicals may be toxic to aquatic life in low concentrations.

SPECIAL CLEANING CHALLENGES AT YELLOWSTONE

Yellowstone presents many challenges that would not be faced at other Federal facilities:

LOCATION: The Park is divided into seven districts with sub-districts. This project had to take into account district and site specific cleaning goals, some of which were not written down. Long distances between the developed areas in Yellowstone and the harsh winter weather make travel and training more difficult. In the winter, much of the travel is done via snowmobile.

STAFF: Yellowstone has a sizable janitorial staff of over fifty employees who work in the Maintenance Department. Some of these workers return year after year. Others work one year, or only during a summer season.

PARK USAGE: So many people visit the Park in the summer that it is hard for the staff to get into the facilities to clean during the day. For example, Old Faithful may have more than 25,000 visitors a day during July and August. Visitors form lines outside the bathrooms when they are closed for cleaning.

FACILITIES: Many park buildings are old, and some are historic structures. Fixtures at some locations are old and stain easily. A few locations have highly mineralized water. Heavily-used vault toilets are pumped every day. Visitor centers have 12-15 feet tall glass or plastic display cases that attract dust, finger prints, gum, and grease.

TYPES OF FACILITIES AT THE PARKS

NATIONAL PARK SERVICE OWNED FACILITIES:

JANITORIAL	Offices Visitor Centers Stores Restrooms Employee facilites Maintenance buildings

CONCESSIONAIRE OPERATED FACIILITIES:

FOOD SERVICE	Kitchens Restaurants
HOUSEKEEPING	Lodging
JANITORIAL	Medical buildings Service and gas stations Gift stores

STAKEHOLDERS: Finally, there are a variety of stakeholders in the parks besides the National Park Service - numerous concessionaires operate facilities in the Park and in some cases, share storage facilities.

BACKGROUND OF THE CONSULTANTS

The consultants for this project had previous experience in converting large and small operations to environmentally preferable cleaning products. They converted Signal Mountain Lodge in Grand Teton National Park in 1991and helped the City of Santa Monica, California, establish their environmentally preferable janitorial products program in the mid-1990's. Santa Monica's program is considered to be one of the leading environmentally preferable janitorial programs in the country.

APPROACH TO THE PROJECT

In August, 1998, the Region 8 Pollution Prevention Program of the U.S. Environmental Protection Agency hired a consultant to assess the cleaning products at a Federal facility and help that facility switch to less toxic products. Yellowstone National Park volunteered to work with the consultants on this project under the umbrella of its "Greening of Yellowstone Initiative."

The Facility Manager for the Park Service was designated as the consultants' primary contact during the project. The consultants also coordinated with the Park Service Chief of Concessions on matters involving work with the concessionaires.

PROJECT TIMELINE

Sept, 1998 Yellowstone National Park volunteers for project

Sept-Nov, 1998 Parkwide inventory of cleaning products, staff interviews

Nov, 1998 Start of winter pilot phase at Mammoth and Old Faithful

Jan, 1999 Installation visits, training, removal of old products

Jan-March, 1999 Follow-up visits to fine tune the projects

March, 1999 Decision to expand project to all Park Service facilities in Yellowstone

April, 1999 Grand Teton National Park joins cleaning project

April-Sept, 1999 Implement project at Park Service facilities throughout both Parks

Sept, 1999 Evaluation by consultants

Edna Good, Chief of Concessions

FACILITY-WIDE INVENTORY AND ASSESSMENT PHASE

The project began in September, 1998, with a Park-wide inventory of existing cleaning products and an assessment of cleaning goals and work practices. The consultants visited all janitorial work stations (both Park Service and concessionaire-operated). The consultants found more than 130 different cleaning products used in Yellowstone at the time of their first visit. An additional 30 products were on the storage shelves but were not being used when this project began. The consultants compiled an inventory of the cleaning products used, interviewed staff and supervisorsand identified specific cleaning needs,

In a project of this type, it is very important to listen to what the staff says about their jobs. The consultants talked with employees and supervisors to learn:

- what the cleaning goals of the organization are
- who establishes the cleaning goals or requirements
- how the staff cleans
- what tools and products are used
- what are their toughest cleaning challenges
- how much time do they have to clean
- how many people use the buildings, restrooms
- how are the buildings or facilities used
- how old are the buildings and fixtures to be cleaned
- what their preferences and perceptions about cleaning products
- how willing is the staff to change their work practices
- what information do they want about new products
- in what format would that information be most useful

Proper equipment and training are crucial to the success of an environmentally preferable cleaning project. At Yellowstone, it was found that appropriate tools of the trade were missing or not available. For example, there were no measuring devices for diluting concentrates. Training had not been done at some locations on how to use disinfectants and properly mix a cleaning product. There was a widespread belief expressed that using a disinfectant for general cleaning would protect the staff from any possible infection or illness. "Topping off" other cleaners with bleach was another practice that staff felt gave them an additional margin of safety. No system of checks and balances to evaluate cleaning techniques or equipment was in place.

PILOT IMPLEMENTATION PHASE

After the inventory and assessment phase, the consultants worked with Park Service staff to set up a pilot implementation phase at Mammoth and Old Faithful during the winter season of 1998. The

purpose of the pilot phase was to test new products at Park Headquarters and a busy winter use area in the center of the Park. With full support from the Park Service Concessions Office, the concessionaires were included in the winter pilot phase of the project. The pilot implementation phase ran from November, 1998, through March, 1999.

BUYING GUIDE AND INSTALLATION PLAN

Maintenance staff at Yellowstone collecting old cleaning products during Pilot Phase.

As part of the pilot, the consultants developed a buying guide for new products and dispensing equipment. The buying guide identified the environmentally preferable products that were most likely to do the required job. The cleaning products selected for this project had previously met the City of Santa Monica's environmentally preferable bid specifications. For more detailed discussions of the products, see pages 13-14 and Appendix D. The consultants also assisted the Park in ordering products, dispensing systems and accessories, to make sure these items were available in time for the installation visit. They identified plumbing and electrical modifications needed for the dispensing systems. Finally, they prepared a training manual for each site that included the products to be used at that site. The training manual was designed so pages could be removed and added as other new products were brought in.

INSTALLATION AND TRAINING VISIT

During the installation visits in January, 1999, the consultants oversaw the onsite set-up at each site. At Yellowstone, all old products were removed when the new products were brought in. This was very important in order to give the new products a fair trial. To eliminate dilution errors, easy-to-use automatic dispensing systems were set up and tested at each location. The dispensing system diluted the product to the correct concentration. Employees were given better equipment, such as squeegees.

Onsite hands-on cleaning demonstrations were given at each location to show:

- how the new products work
- proper measuring procedures
- different cleaning techniques to improve the performance of the environmentally preferable cleaning products

For instance, more time or elbow grease may be required when using less toxic products. The consultants demonstrated cleaning techniques such as use of squeegees for window cleaning and using water as a cleaning agent - i.e., rinsing surfaces with water after cleaning instead of using a spray and wipe method with no rinsing.

Additional training included instruction on proper use of disinfectants and sterilizers, which are commonly overused or used inappropriately. Site specific training manuals were handed out to each employee and supervisor.

FOLLOW-UP VISITS

After the initial round of visits to each location, periodic follow-up visits were made. The purpose of these visits was to adjust the program to fit into the routines, workload and culture of the organization. Follow-up visits were also necessary to ensure correct understanding of project objectives and procedures. The consultants coached the staff and supervisors until the use and performance of the new products became routine.

The consultants and the product manufacturer also provided trouble-shooting expertise. The consultants researched particular questions. The manufacturer recommended switching from plastic to stainless steel soap dispensers in high traffic areas. The manufacturer also addressed product formulation issues. In some cases, dilution ratios or formulations were adjusted for site-specific needs.

IMPLEMENTING THE PROJECT ACROSS YELLOWSTONE

Lexi Marsh, Maintenance Employee at Madison Junction, Yellowstone National Park

In March, 1999, at the end of the pilot phase, the consultants received feedback from the cleaning staff, supervisors and senior management about the project. The pilot phase demonstrated that it was possible to meet Park cleaning needs using environmentally preferable cleaning products. After a briefing on the project by the consultants and Maintenance managers in April, 1999, the Park Superintendent decided to expand the cleaning project throughout the Park during the spring and summer seasons. Two concessionaires - the Yellowstone Park Service Stations and the medical clinics - also converted their operations throughout the Park. A third concessionaire expanded its pilot programs.

Throughout the rest of the Park, the consultants followed the same steps as for the pilot phase - developing buying guides and planning for installation, conducting the installation visit and training, and doing follow-up visits. Expanding the project to all Park Service operations brought new challenges.

The distances to be traveled increased as did the number of visitors to the Park. Summer visitation at Yellowstone is very high between July 1st and the end of August. The Old Faithful area may be visited by over 25,000 people a day during these months. With that many people, the janitorial staff has a difficult time closing the bathrooms to clean them, and has to work very quickly to accommodate the line of people waiting for the bathroom to reopen. Adjustments were made to the program throughout the summer to accommodate the staff's needs.

EVALUATION

In September, 1999, at the end of the summer season, the consultants conducted an evaluation at Yellowstone. The Park was able to reduce the number of cleaning products needed by over 80%, from 130 different products to 15 environmentally preferable products which met the 1998 Santa Monica bid specifications, plus three others used occasionally for special purposes. For a more detailed discussion of the products used at Yellowstone and Grand Teton, please see Appendix D.

Hank Quintana, Warehouse Supervisor, stocks most cleaning product and containers at Mammoth.

With such a large reduction in the number of products, benefits were achieved in many areas. The acquisition process was simplified. Stocking fewer products resulted in better inventory control and reduced storage needs. Because he is familiar with the acceptable cleaning products, the warehouse manager has identified several requests for unapproved cleaning products and sent them to the Facility Manager for review.

Dispensers prevent waste by measuring the concentrate accurately. Dispensers also minimize contact with the concentrate, which is

5- gallon containers of cleaning products at the Mammoth Warehouse

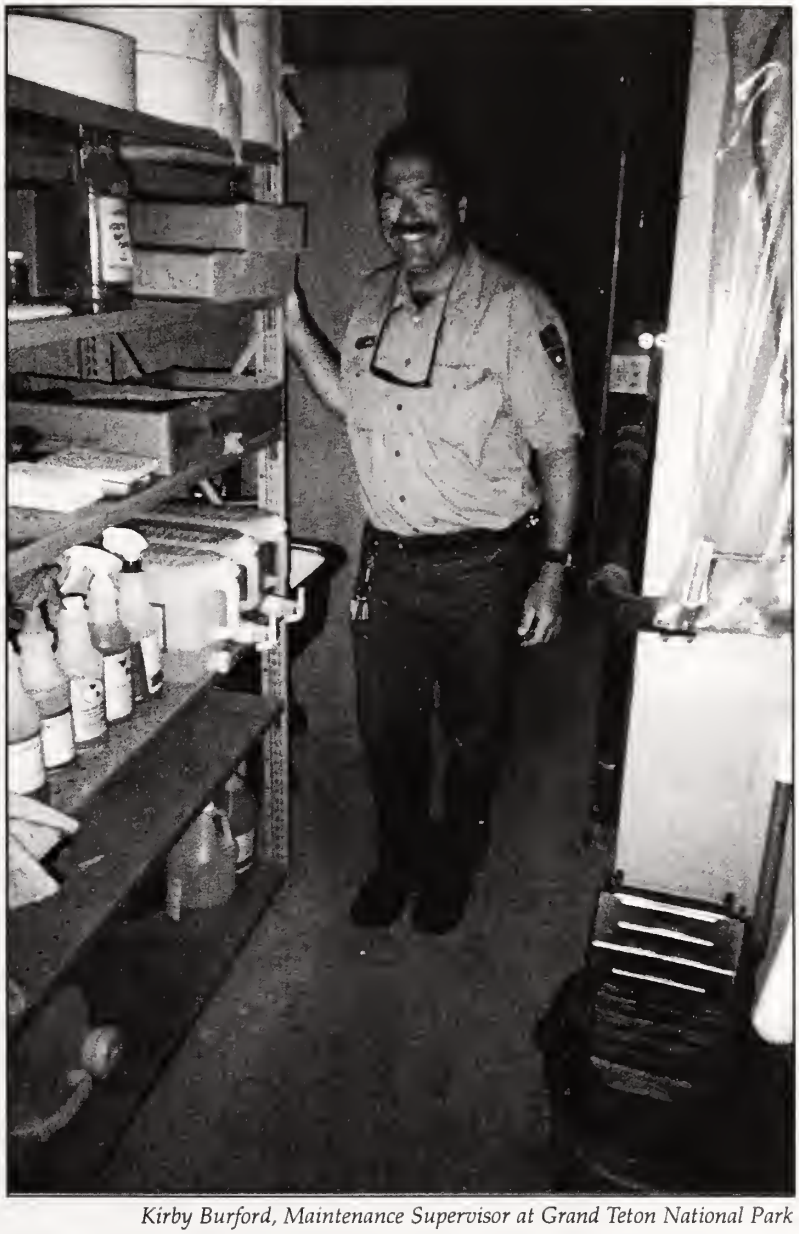
purchased in bulk five gallon and one gallon containers. The containers that cannot not be returned for reuse are recyclable.

This project also changed the thinking of some of the janitorial staff. For example, the bathroom cleaner in one restroom location was not strong enough to absorb the smell in the unsealed concrete flooring. Prior to this project, a stronger product would have been the solution to this dilemma. Instead of a stronger product, custodial staff suggested sealing the concrete so that the environmentally preferable product could be used.

EXPANSION OF THE CLEANING PROJECT TO GRAND TETON

In April, 1999, Jack Neckels, the Superintendent of Grand Teton National Park, decided that Grand Teton would join the cleaning project at the same time as expansion of the project across Yellowstone. Park staff were ready to purchase products for the upcoming season, making it the perfect time to start a new program.

Park personnel were familiar with the consultants' work at Signal Mountain Lodge in the early 1990's and had been using some "green" products on a trial basis. After talking with the staff at Yellowstone and getting positive feedback about the way their pilot was working, management decided to join the full program. The consultants were able to set up the program quickly and worked closely with suppliers and staff.



Kirby Burford, Maintenance Supervisor at Grand Teton National Park

Grand Teton, a smaller park than Yellowstone, has one supervisor and 16 seasonal custodial employees during the summer. In the winter, the supervisor does all the cleaning. The staff at Grand Teton face many of the same cleaning challenges, including a visitor center, restrooms, vault toilets and offices.

Grand Teton benefitted by reducing the number of products used and by simplifying the distribution and storage of products. The supervisor and custodial staff were very experienced in cleaning and were familiar with many types of products. The process of moving to environmentally preferable products allowed these employees to discuss what worked and to come up with their own ideas on how to use the new products most effectively. The reduced exposure to potentially harmful substances motivated and excited the staff.

During the summer season, the staff evaluated the cleaning products and was very satisfied overall with the new products and methods. The staff will continue to experiment with new environmentally preferable products as they become available, while maintaining the basic simplicity of the operation and use of the dispensing equipment.

ENVIRONMENTALLY PREFERABLE PRODUCTS USED AT YELLOWSTONE AND GRAND TETON

By the end of the project, most cleaning products used in Yellowstone and Grand Teton were made from plants like corn and soy instead of petroleum, a non-renewable resource. Appendix D contains a listing of the products the Parks were using at the end of this project. All but three products used in Yellowstone and one at Grand Teton meet the 1998 bid specifications for the city government of Santa Monica, California, according to the manufacturer.

The Santa Monica bid specifications require that these products meet the international Organization for Economic Cooperation and Development (OECD) definition of "readily biodegradable." In conformance with the bid specifications, the products do not contain known or probable carcinogens, mutagens, or teratogens designated under Federal or California state laws. The specifications do not allow ozone depleting chlorinated compounds, or any chemicals reportable under Section 313 of the Emergency Planning and Community Right-to-Know Act [except for floor care products and metal polishers]. The volatile organic compound (VOC) levels must meet or be less volatile than the California Code of Regulations maximum allowable VOC levels for appropriate cleaning product categories. No products can contain alkyl phenyl ethoxylates (hormonal mimics) above trace amounts. No products can be delivered in aerosol cans.

At the Parks' request, dyes are used in several products to help employees differentiate between those products. These dyes are among the few approved by the U.S. Food and Drug Administration for food use. Where fragrances are included, such as deodorizers in the enzymatic stain treatment or the air freshener, the product contains peppermint or d-limonene, a citrus-based ingredient, in lieu of petrochemical-derived fragrances. Recycled or recyclable packaging is used. Many of the products are made in concentrated formulations and purchased in bulk. The products are dispensed through automatic systems, which reduce employee contact with the concentrate, and ensure consistency in dilution ratios.

An environmentally preferable approach to cleaning is to minimize the use of disinfectants. Disinfectants, by their nature, are designed to kill microorganisms. Per the Santa Monica bid specifications, the Parks do not use general cleaning products with added disinfectants. Instead, they use quaternary ammonium chloride, a non-bleach disinfectant, for limited applications. The use of bleach was dramatically reduced when the new disinfectant was substituted and workers were trained in disinfection techniques.

As mentioned above, three products used at Yellowstone and one at Grand Teton do not meet the City of Santa Monica's bid

specifications because they contain petroleum distillates (TRI chemicals), or have a high or low pH. These products include a special degreaser/cleaner used for greasy floors in shop areas, a delimer/descaler used for occasional heavy build-ups, and a graffiti remover. These products were tried only where environmentally preferable products did not meet the cleaning requirements of the district supervisor. The use of these products is limited to specific situations. The Parks are continuing to look for environmentally preferable alternatives.

Both Yellowstone and Grand Teton remain interested in finding a deodorizer for heavily used vault toilets that can meet the City of Santa Monica's bid specifications. Some toilets are pumped every day to make them as appealing as possible to visitors. Daily pumping does not give the environmentally preferable enzymatic deodorizers time to work. Plastic-coated glass has been another cleaning challenge at Yellowstone. Finally, the natural floor finish product that brought out the shine on linoleum floors like the ones in Yellowstone Fleet Maintenance, lacks high buffing characteristics on old wooden floors. The Parks' goal is to find environmentally preferable products to meet these challenges.

WHY DID YELLOWSTONE AND GRAND TETON SUCCEED?

THE PARKS SUCCEEDED BECAUSE OF:

- **Support from the top.**
- **Implementation of a pilot project.**
- **Commitment to the project by key employees and supervisors.**
- **Education of custodial staff in face-to-face meetings.**
- **Perceived health benefits.**
- **Simplification of purchasing and reduced storage space.**
- **Maintenance of the vision.**
- **A willingness to look for opportunities to improve.**

Support from the top: The support of the top level official is essential. The Superintendents at both Yellowstone and Grand Teton National Parks told the custodial staffs and supervisors that this was an important project and everyone's support was expected.

Implementation of a pilot program: Introducing the program on a limited basis allowed the Park to test products for performance, involve onsite janitorial staff in the decision-making process, and create a positive first-hand experience that reduced resistance and skepticism. Including custodial staff in the decision on whether to expand the pilot program across the facility was very important.

Commitment to the project by key employees and supervisors: Support by key employees who had the respect of their peers made a significant difference. Supervisors who were interested in moving to environmentally preferable products were able to help their employees overcome fears and doubts. A strong commitment to the project encouraged and united those who had less security in making these changes.

Education of custodial staff in face-to-face meetings: Experts in the environmentally preferable cleaning field provided hands-on training to help the staff understand the entire program. Questions were answered, and reasons for embarking on an environmentally preferable cleaning project were explained. This training was very effective in demonstrating for skeptical staff that alternative products can work as well or even better than conventional products.

Perceived health benefits: In addition to showing that environmentally preferable products work, experience has shown that informing employees about potential health benefits of

environmentally preferable products is an important step to gain support. The fast acceptance of this project by some employees at Yellowstone resulted in part from perceived health benefits - no sneezing, red eyes, headaches, sore throats. It should be noted that no medical monitoring was done during this project, but numerous employees commented to the consultants that they felt better after the switch to environmentally preferable cleaning products.

Simplification of purchasing and reduced storage space: At Yellowstone, most of the new cleaning products are stocked at the central warehouse in Mammoth. Because the same products are used throughout the Park, all districts are able to fill most of their cleaning supply needs from the warehouse. The need for onsite hazardous material cabinets at each location was also reduced.

Maintenance of the vision: In a large scale change project, it is important to have a vision of the completed project with all details addressed. In this project, seeing the end from the beginning helped to overcome many problems.

Willingness to look for opportunities to improve: The champions in the Parks are always looking for new applications for environmentally preferable products.

Yellowstone back country in May

LESSONS LEARNED FOR FUTURE PROJECTS

LESSONS LEARNED

- **Coordinate early with warehouse and purchasing.**
- **Have champion at each location.**
- **Demonstrate strong management commitment.**
- **Communicate top level commitment.**
- **Explain use of personal protective equipment.**
- **Do increased oversight at first.**
- **Verify proper use of products.**
- **Involve the staff in making changes.**
- **Understand that personal preferences can affect acceptance.**
- **Share success stories.**
- **Quantify the cost savings.**

Early coordination with the warehouse manager/staff and purchasing departments is important. They can be great advocates.

Support for the project must come from within the District itself. It works best if it comes from both the supervisor and the staff. Not all locations at Yellowstone supported the cleaning project. When neither the supervisor nor custodial staff assumed leadership for the program, the change to environmentally preferable cleaning products was difficult. There must be a champion for the project at each location for such a large scale initiative to succeed.

However, in every pollution prevention project, there will be individuals who resist any change. Only a demonstration of facility-wide determination to go forward will persuade those unwilling to participate.

Most problems can be solved with a strong visible management commitment and good communications. At every opportunity, top level commitment from managers should be restated to supervisors and employees if the program is to move forward..

The need for personal protective equipment should be explained to staff as appropriate.

Increased oversight for the first several weeks of each implementation phase is important to make sure everyone is familiar with proper dilutions, the training manual, and cleaning techniques that will work with the new products, etc. This can prevent problems later.

If a product doesn't seem to be working, first check to see how it is being used. It could be that the dilution rate is incorrect, the suggested cleaning procedures are not being followed, or the product is being used for something for which it was not designed.

If the proper dilutions and procedures are being followed and the product still is not working, involve the staff in finding another environmentally preferable product or changing the procedures.

In some cases, personal preferences can affect whether a person thinks a product works or not. At Yellowstone, one couple said the basin, tub and tile cleaner was the best product they had ever had, while another couple cleaning at the same location on a different day reported the product was the worst product ever used.

One cleaning product may have several purposes. Share success stories with other locations that may have similar problems.

The parks did not quantify their cost savings. Collecting and publicizing cost data (using environmental cost accounting) can increase management support and help others to implement similar projects.

RECOMMENDED NEXT STEPS

RECOMMENDED NEXT STEPS

- **Formalize the program.**
- **Create formal evaluation process for new chemicals.**
- **Provide ongoing support.**
- **Create network of champions.**
- **Evaluate and report on progress.**
- **Add cleaning project to interpretative program.**
- **Encourage concessionaires to implement.**
- **Promote to other Federal facilities.**

There are a number of areas where the Park Service can continue to actively support this project in the future:

It will be important for the Park Superintendent to demonstrate continued commitment for the project to Park employees. He can do that by issuing a written policy supporting the program, by ensuring that Maintenance documents the procedures and periodically updates them, and by asking for regular progress reports.

The search for environmentally preferable products for several situations needs support. Over the next year, alternative products for masking odors in vault toilets, cleaning plastic-coated glass in restrooms, and stripping and buffing old wood floors will be tested within the parks. A process for evaluating these products is needed.

Supervisory and staff champions should provide leadership for returning crews in the winter and spring/summer/fall seasons. For instance, training should be done at the start of each season and when new products are introduced. The manuals and laminated cards on the back of the cleaning closet doors should be updated if new products are brought in.

At Yellowstone, a network of these champions could be formed to share success stories and help resolve any questions or problems that arise.

Periodic program evaluations should be continued and the results reported to top management.

The Park Service could include the environmentally preferable cleaning project in its interpretative program to educate Park visitors on the leadership role these Parks have assumed.

The Park Service could encourage their concessionaires to implement environmentally preferable cleaning products programs.

Yellowstone and Grand Teton could continue to promote this project to other Federal facilities.

Now that the cleaning project has been established, it is important to complete these last steps and integrate the project into Park management systems so it can continue to flourish and expand.

APPENDIX A

WHY CHANGE TO ENVIRONMENTALLY PREFERABLE CLEANING PRODUCTS?

WHY CHANGE TO ENVIRONMENTALLY PREFERABLE CLEANING PRODUCTS?

Many common cleaning products contain chemicals which, in their pure form, have been shown to have health effects and/or which pose storage and disposal concerns. The potential for a cleaning product to cause problems depends on the concentration and formulation of the ingredients, and on how the product is stored, used and disposed.

While indoor air quality problems can arise from inadequate housekeeping that fails to remove dust or other contaminants, cleaning products themselves produce odors and emit a variety of chemicals that can contribute to poor indoor air quality. The U.S. Environmental Protection Agency's Total Exposure Assessment Methodology (TEAM) studies indicate that while people are using products containing organic chemicals, they can expose themselves and others to high pollutant levels. Elevated concentrations of pollutants can persist in the air, particularly in enclosed spaces and poorly ventilated areas. Selecting cleaning products that minimize these emissions can provide a clean environment while protecting the health of workers and occupants.

There is growing evidence that some chemicals in cleaners are agents that cause asthma or make it worse. In a June, 1999, surveillance of work-related asthma in selected US states - California, Massachusetts, Michigan, and New Jersey - using surveillance guidelines for state health departments showed that in 4.6% of work-related asthma cases (51 cases out of 1,101), the putative agent was cleaning materials.

An occupational lung disease bulletin issued by the Massachusetts Department of Public Health in April, 1998, reported that more than 10% of the work-related asthma cases reported list cleaning agents as the suspected asthma agent. These cleaning agents included bleach, chlorine, floor stripper, ammonia, sodium hydroxide, muriatic acid, detergents and disinfectants.

Finally, in the preamble to Occupational Safety and Health Administration's (OSHA) revised Hazard Communication Standard (59 FR page 6151), OSHA cited data from the Consumer Product Safety Commission's (CPSC) National Electronic Injury Surveillance System (NEISS). These data concerned work-related chemical injuries from consumer products where the injury was treated in an emergency room in 1986. The data were provided by emergency rooms to the National Institute for Occupational Safety and Health. According to CPSC, soaps, detergents and "cleaning compounds not classified elsewhere" were cited as responsible for 10, 252 work-related emergency room visits.

These limited data suggest that users of cleaning products should look for the least toxic product that can do the job in order to minimize potential health and safety risks.

APPENDIX B

Ingredient Guide and Glossary

Ingredient Guide and Glossary *

This glossary describes some of chemicals commonly found in cleaning products and some related terms. Some janitorial products can cause chemical, health or environmental hazards. The potential for a cleaning product to cause problems depends not only on its physical and biological properties, but also on the concentration and formulation of the ingredients in the product, and most importantly, how it is stored, used or disposed. For example, using a volatile chemical in an enclosed space without adequate ventilation would pose more of a hazard than using it in a large room with open windows. Similarly, using a corrosive product without wearing personal protective equipment would increase the risk.

Acetone [CAS No. 67-64-1] - Flammable volatile liquid with distinctive odor. Reacts explosively with hydrogen peroxide. Irritating to eyes, respiratory tract and skin. May be absorbed by inhalation. Can cause changes in liver's ability to metabolize chemicals, kidney damage, dizziness, sedation and coma.
Uses: Spot and graffiti remover, solvent.

Acids - Solutions with a pH range between 0 to 6.9. They are corrosive between pH 0 and 2.0 and produce severe burns on contact. See also pH. Uses: Many cleaning products (e.g., delimers, bathroom cleaners, bowl cleaners) are acidic.

Acute health effects - Effects which occur rapidly as a result of short-term (usually less than 24 hours) exposures. Acute effects are usually of short duration, but long term effects can occur after one exposure. Examples include irritation, corrosivity, chemically-induced unconsciousness (narcosis), or death.

Aerosol propellants - Gases used to pressurize spray products. Chloroflouorocarbons, which deplete the ozone layer, may be found in old cleaning products. Today other chemicals, such as isobutane, a petroleum product may be used. Hydrocarbon propellants like isobutane contribute to smog problems because of their contribution to tropospheric (ground level) ozone formation .

Alkalies (bases) - Solutions with a pH range between 7.1 to 14.0. An alkali is corrosive when pH is higher than 11.5. See also pH.
Uses: Many cleaning products (e.g., bleach, detergents, dishwashing soaps, drain openers and oven cleaners) are alkalies.

Ammonium chloride [CAS# 12125-02-9] Colorless crystals which are soluble in water and ammonia. Dust is mildly irritating to eyes, nose and throat. See also Ammonia compounds, Quaternary ammonium chloride. Ammonium chloride is harmful to aquatic life in very low concentrations.

Ammonia compounds (Includes ammonium chloride [CAS No. 12125-02-9], ammonium hydroxide [CAS No.1336-21-6], benzalkonium chloride [CAS No. 8001-54-5]) - Usually liquids with

a pungent odor. Corrosive in concentrations found in commercial products (over 10%). Forms irritating cloramine gas when combined with chlorine-containing products. Fumes can cause irritation of the eyes, respiratory tract. Liquid can cause skin burns. Toxic to fish, and reduces oxygen in surface water.
Uses: In many cleaning products, depending on concentration, as antiseptic, bactericide, fungicide, sanitizer, deodorant. Used in detergents as a surfactant. Also found in floor polish, glass window cleaners, household hard surface cleaners, rug and upholstery cleaners

Benzene [CAS No. 71-43-2] - Flammable liquid with a sweet odor.. Toxic to bone marrow, and a cause of leukemia in humans. In 1978, the Consumer Product Safety Commission outlawed its use in many cleaning products, although it may still be found in old stocks. Degrades slowly. See BOD discussion.
Uses: Spot remover, carpet spotter, laundry starch preparations.

Biodegradable - Capable of being converted to simpler chemicals by microorganisms.

Biological oxygen demand (BOD) - refers to increased use of oxygen by microorganisms in surface water when they metabolize organic chemicals. The total BOD load in an aquatic ecosystem is an important water quality parameter because this increased use of oxygen reduces amounts available to aquatic organisms like fish. At the same time, it is important to note that the availability of carbon sources (essentially what BOD measures) is often not the primary limiting factor in the growth of microorganisms in an aquatic ecosystem. In many aquatic systems other nutrients such as nitrogen or phosphorus are the limiting factors in microbial growth and it is the additional loading of these nutrients, rather than carbon, that is the primary factor in excessive microbial growth and oxygen depletion.

2-Butoxy ethanol [CAS No. 111-76-2] (Also known as Ethylene glycol monobutyl ether; Monobutyl ethylene glycol) - Incompatible with bleach. May damage eyes and respiratory tract. Absorbed through the skin. May cause liver and kidney damage; causes birth defects in lab animals. With chronic exposure, causes central nervous system toxicity, testicular atrophy.
Uses: In many cleaning products, including glass, window and all-purpose cleaners.

Carbolic Acid - see Phenol

Carcinogen - Chemical capable of causing cancer.

Cardiac sensitizer - Chemical which, upon repeated exposure, can in some persons cause the heart to become sensitive to the stimulant properties of epinephrine (which is produced by the body's adrenal glands). Subsequent exposure to the sensitizer may cause fatal cardiac arrhythmias. Some chlorinated solvents are sensitizers.

CAS number - Chemical Abstract System number. A unique number used to identify each chemical.

Caustic soda - see Lye

Central nervous system depressant- Chemical toxic to neurons in the brain. With increasing acute exposure, CNS depressants cause headache, dizziness, confusion, euphoria, drowsiness, loss of consciousness and death through inhibition of breathing. Chronic exposure may cause tremors, personality changes, visual impairment, and loss of hearing, memory, or intellectual capacity. Many organic solvents are CNS depressants.

Chlorine [CAS No. 7782-56-5] (including sodium hypochlorite, Clorox) - Strong oxidizer. Produces toxic chloramine gas when mixed with ammoniated cleaning products. Corrosive to eyes and skin. Fumes are irritating or corrosive to the respiratory tract. Can kill microscopic life in waterways, septic tanks and sewage treatment plants. Toxic to aquatic life
Uses: Bleach, disinfectants, all-purpose cleaners, mildew remover, bathroom cleaners, spot removers, or in scouring powders.

Chlorine dioxide [CAS No. 10049-04-4] (chlorine oxide) - Strong oxidizing gas which can be dissolved in cold water. It may react with hot water or steam to produce toxic and corrosive fumes of hydrochloric acid. Severe respiratory and eye irritant.
Uses: bactericide & antiseptic

Chronic health effects - Effects which generally occur as a result of long-term exposure, and are of long duration. Examples include cancer, liver damage and chronic bronchitis.

Combustible - A substance having a flash point at or above 100 Fahrenheit up to and including 150 Fahrenheit, according to the Consumer Product Safety Commission. The Occupational Safety and Health Administration defines a combustible liquid as having a flashpoint at or above 100 Fahrenheit but below 200 Fahrenheit.

Corrosive - Chemical which, upon contact can cause deep tissue damage, such as burns to eyes or skin.

Dicholoromethane - see Methylene chloride

Dimethylbenzene - see Xylene

Dyes - (Includes azo, basic, disperse, fiber-reactive, vat dyes and fluorescent agents) May cause allergic reactions.
Uses: As colorants or whitening agents in many products, including all-purpose cleaners, disinfectants, fabric softeners.

Ethanol (alcohol) [CAS No. 64-17-5] - Clear liquid which can be absorbed by inhalation and across skin. Central nervous system depressant. Vapors can produce some eye and upper respiratory tract irritation.
Uses: Detergents, disinfectants, carpet cleaners, tub and tile cleaners, air fresheners.

Ethylene glycol monobutyl ether: See 2-Butoxy ethanol

Flammable - a substance having a flash point above 20 and below100 Fahrenheit, according to the Consumer Product Safety Commission. An extremely flammable substance has a flashpoint at or below 20 Fahrenheit.

Fragrances - Any of 4,000 chemicals. May cause skin irritation discoloration, rashes or allergic reactions. May be irritating to the eyes and respiratory tract.
Uses: Many cleaning products, either to simulate the scent of "fresh air", flowers, etc., or to mask odors of other chemicals in the product.

Incompatible - Chemicals which are incompatible react violently or produce toxic byproducts.

Irritation - Redness, swelling or tissue damage caused by chemicals. The degree of irritation is dependent on dose. Chemical irritation may result in mild skin itching, or fatal damage to the lungs.

LC50/ Lethal concentration - A measure of acute toxicity. The lethal concentration that if inhaled will kill half of a group of organisms in an experiment in a given time. In EPA's Toxic Substances Control Act program, a chronic LC50 or EC50 < 0.1 mg/L is highly toxic; 0.1 mg/L $<$ chronic LC50 or EC50 $<$ 10 mg/L is moderately toxic; and a chronic LC50 or EC50 $>$ 10 mg/L is a low toxicity.

LD50/ Lethal dose - A measure of acute toxicity. The lethal dose that will kill 50% of lab animals exposed to it orally or through the skin. The lower the LD50, the more toxic the compound.

Limonene (d-Limonene, 4-isopropenyl-1-methylcyclohexene [CAS No. 5989-27-5]) - A flammable, colorless liquid found in some plants. Skin irritant, sensitizer. If ingested in sufficient quantity, may be toxic to kidneys. When heated to decomposition, emits acrid smoke, fumes.
Uses: aerosol, non-aerosol deodorants/air fresheners, bathroom tub and tile cleaners, hard surface cleaners, liquid laundry detergents, dry cleaning pre-spotter, polishing preparations, mechanics soap, oven cleaners, rug/upholstery cleaners, other specialty cleaning and sanitation products

Lye (caustic soda, sodium hydroxide [CAS No. 1310-73-2] , potassium hydroxide [CAS No. 1310-58-3]) - Corrosive white crystals or colorless liquid. Liquid may cause severe eye burns or blindness, or skin burns with subsequent tissue scarring. Vapors are irritating to the eyes and respiratory tract. Aerosol formulations present an inhalation hazard.
Uses: Drain opener, oven cleaner, detergents.

Methylbenzene - see Toluene

Methylene Chloride (methylene dichloride; dichloromethane) [CAS No. 75-09-2]. Colorless liquid. Incompatible with strong oxidizers and caustics. Central nervous system depressant. Probable human carcinogen.

Uses: Disinfectant, all-purpose cleaner, degreaser, septic tank cleaner, laundry starch preparations, rug and upholstery cleaners.

Monobutyl ethylene glycol - see 2-Butoxy ethanol

Naphtha see Petroleum distillates

Naphthalene [CAS No. 91-20-3] White crystalline solid with the odor of mothballs. Skin exposure may cause severe dermatitis. Irritating to eyes and respiratory tract. Inhalation may cause headache, nausea, confusion, damage to red blood cells. Possible human carcinogen.
Uses: Detergents, air fresheners, spotters.

Nitrobenzene [CAS No. 98-95-3] - A yellow oily liquid with an odor like shoe polish. May be absorbed via inhalation and through the skin. Chronic inhalation may cause liver damage. May bind with blood to reduce oxygen availability. Central nervous system depressant.
Uses: Furniture polish, floor polish.

Organic chemical - A chemical which contains carbon. Chemicals which do not contain carbon are termed "inorganic."

Oxidizer (oxidizing agent) - A chemical capable of reacting with other chemicals in an "oxidation" reaction. Chemical reactions involving strong oxidizers may release heat or be explosive.

pH - A measure of the acidity or alkalinity of a solution. A pH of 7 is considered neutral. A pH greater than 7 indicates alkalinity. A pH less than 7 indicates acidity. In the absence of specific test data on irritation, pH provides some insight into whether a product will be corrosive or cause irritation. Products with very high or very low pH (11.5 or 2) should be assumed to be corrosive. High or low pH values (e.g., between 9 and 11, or between 4 and 2) indicate the product would be more irritating than neutral pH products where the pH is closer to 7.

Perchloroethylene (tetrachloroethylene; ethylene tetrachloride; PERC) [CAS No. 127-18-4] - Colorless volatile liquid about 1 ½ times heavier than water. Central nervous system depressant, liver and kidney toxicant. Inhalation may cause respiratory tract irritation or cardiac arrhythmias. Irritating to the skin and eyes on direct contact. When released in water, can smother small aquatic life. Can be toxic to sewage treatment bacteria.
Uses: Graffiti remover, carpet spotter, metal cleaner, degreaser, dry cleaning solvent, furniture polish, household hard surface cleaners, laundry starch preparations, oven cleaner.

Petroleum distillates - The lighter liquid hydrocarbons refined from crude oil by distillation, including petroleum ether, naphtha, mineral oil, mineral spirits, Stoddard solvent and kerosene. (Heavier distillates include lubricating oil, grease, paraffin wax and asphalt; gaseous distillates include propane, butane). Liquid petroleum distillates contain varying, but usually small amounts of aromatic

hydrocarbons (benzene, toluene, xylene, cycloparaffins, naphthenes). Liquid petroleum distillates are flammable. They are skin, eye and respiratory tract irritants. See also VOC.
Uses: Found in many janitorial cleaning products.

Phenol (carbolic acid) [CAS No. 108-95-2] - Colorless crystals, which can be dissolved in water or some organic solvents. Liquids have sweetish, sickening odor and can burn skin and eyes. In aqueous solution, phenol is not highly volatile, but it is readily absorbed through the skin. Abnormal pigmentation commonly occurs following dermal contact with phenolic compounds. Vapors are strongly irritating to eyes, nose and throat. Exposure by inhalation to a low concentration of phenol six times for five minutes produced increased sensitivity to light.
Uses: In detergents, disinfectants, deodorants, furniture polish, air fresheners, mold and mildew removers.

Phosphates - Environmental hazard. Phosphate-containing compounds increase biological oxygen demand in surface water.
Uses: In detergents, bathroom cleaners, floor strippers.

Phosphoric acid [CAS# 7664-38-2] - Colorless, odorless liquid. Corrosive to ferrous metals and alloys. Should not be mixed with bleach or ammonia. An irritant to the eyes, upper respiratory tract, and skin. Phosphorus-containing compounds increase biological oxygen demand in surface water. When used as an agent for metal cleaning, phosphoric acid may react with impurities in the metal and release phosphine gas.
Uses: Metal brighteners, cleaners, detergents, sanitizers.

Pine oil [CAS# 8002-09-3]- Flammable liquid. An irritant to the eyes, upper respiratory tract, and skin. May cause mild respiratory and central nervous system depression, and kidney toxicity.
Uses: In floor polish, glass window cleaners, hard surface cleaners, liquid detergents, toilet bowl cleaners, disinfectants.

Potassium metabisulfite [CAS#16731-55-8] — Colorless crystals which are soluble in water and ammonia. Dust is mildly irritating to eyes, nose and throat. See also Sulfur compounds.
Uses: Washing powders.

Quaternary ammonium chloride (didecyl dimethyl ammonium chloride) [CAS# 7135-51-5] A flammable liquid. Corrosive. An irritant to the eyes, skin, upper respiratory tract. May cause central nervous system depression. Ingestion may cause pain, swelling, breathing difficulty, convulsions. Ammonium chloride is harmful to aquatic life in very low concentrations.
Uses: Disinfectant, sanitizer.

Sensitizer - a chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction after repeated exposure to the chemical.

Sodium bisulfite - see Sulfur compounds

Sodium dodecyl benzene sulfonate [CAS No. 25155-30-0] - Environmental hazard. Increases biological oxygen demand in surface water. See also Biological oxygen demand.
Uses: As a wetting agent (surfactant) in heavy duty laundry products; metal cleaners, specialty cleaners and sanitation products.

Sodium hydroxide - see Lye

Sodium hypochlorite - see Chlorine

Solvent - Liquid used to dissolve other substances. Aqueous solvents consist primarily of water, while organic solvents can include a variety of organic chemicals such as acetone, benzene, toluene, ethyl acetate, butyl acetate, xylene, and turpentine. Most organic solvents are Volatile Organic Compounds (VOC) that contribute to smog problems because of their contribution to tropospheric (ground level) ozone formation.

Sulfur compounds (including potassium metabisulfite [CAS No. 16731-55-8] and sodium bisulfite [CAS No. 7631-90-5]) - Corrosive irritant to skin, eyes, and mucous membranes; sulfur-containing compounds may be allergenic and may produce skin rashes or difficulty breathing in persons with asthma. When used in rust removers, may produce fumes of sulfur dioxide, a respiratory irritant.
Uses: Antioxidant and preservative in a variety of cleaning products.

Tetrachloroethylene - see Perchloroethylene

Toluene (methylbenzene) [CAS No. 108-88-3] - Volatile, flammable liquid with strong chemical odor. Eye, skin and respiratory irritant. Central nervous system depressant. Cardiac sensitizer. Prolonged or repeated exposure may cause liver, kidney damage or anemia. Exposure during pregnancy may result in birth defects.
Uses: Solvent in a variety of products such as graffiti remover, floor polish, furniture polish, laundry starch preparations, household hard surface cleaners.

Trichloroethane (1,1,1-trichloroethane [CAS No. 71-55-6]; 1,1,2-trichloroethane [CAS No. 79-00-5]) - colorless liquid with mild chloroform-like odor. Because it is four times heavier than air, vapors tend to collect in low spaces. Corrosive to aluminum. Repeated dermal exposure may result in skin irritation. Central nervous system depressant. Cardiac sensitizer. The 1,1,1- isomer is also a Class 1 ozone depleter (like CFCs) being phased out under the Clean Air Act.
Uses: Solvent, degreaser, spotting fluid, drain cleaner; formerly used as an aerosol propellant.

Trichloroethylene [CAS No. 79-01-6] - Colorless liquid with mild chloroform-like odor. Because it is four times heavier than air, vapors tend to collect in low spaces. Suspected human carcinogen. Central nervous system depressant. Cardiac sensitizer. Associated with birth defects of the heart, and in animals, decreased fetal weight and abnormal sperm.

Uses: Degreaser, solvents, graffiti remover.

Volatile Organic Compounds (VOC) - in this context, VOC means any organic compound (carbon containing) which has a vapor pressure of greater than 0.1 mm Hg or, if the vapor pressure is unknown, has 12 or fewer carbon atoms. Volatile organic chemicals (VOCs) in cleaning products are of potential concern because of indoor air exposures to office workers and others. They are also of concern because they contribute to the formation of smog in outdoor air. All VOCs, even those VOCs that do not contribute to smog formation, are of potential concern for indoor air quality.

Xylene (dimethylbenzene) [CAS No. 1330-20-7] - Colorless, flammable liquid with a sweet odor. May attack some forms of plastic and rubber. Incompatible with strong oxidizers. Vapor may cause irritation of the eyes, nose, and throat. Central nervous system depressant. Chronic exposure to xylene may cause dry irritated skin, reversible eye damage, difficulty breathing, changes in liver function, kidney damage, anemia, and toxicity to white and red blood cells. **Uses:** Solvent, air fresheners, stainless steel cleaner, floor polish.

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* The information in the Ingredient Guide and Glossary was based upon a variety of sources.

Information on which chemicals are in cleaning products came from the authors, the Environmental Defense Fund's Scorecard Internet site at www.scorecard.org and the EPA Region V/ Purdue University Internet site at www.epa.gov/grtlakes/seahome/housewaste/house/mainmenu.htm.

Health effects information was extrapolated from information in the Toxicology, Occupational Medicine and Environmental Series (TOMES) Consolidated Point Solution (CPS) online databases, which include the Hazardous Substances Data Bank, Meditext, Hazardtext, the Chemical Hazard Response Information System, the National Institute for Occupational Safety and Health Pocket Guide, the Integrated Risk Information System, the Registry of Toxic Effects of Chemical Substances, and the New Jersey Hazardous Substances Fact Sheets. This resource is available through a paid subscription or at some medical libraries.

Abbreviated health information, precautions for use and disposal information are available online through : www.epa.gov/grtlakes/seahome/housewaste/house/mainmenu.htm by clicking on the Glossary of Hazardous Products and Compounds.

APPENDIX C

The Challenge of Evaluating Cleaning Products

The Challenge of Evaluating Cleaning Products

Before the Federal Hazardous Substances Act (1973) and OSHA's Hazard Communication Standard (final rule published in 1983, expanded in 1987, and amended in 1994), there was little information for assessing possible health risks from cleaning products. Today, Material Safety Data Sheets (MSDS) are the most commonly known sources of information for evaluating cleaning products for their hazards or toxic constituents. A label on a cleaning product also lists hazard warnings which supplement the MSDS. While MSDS and product labels now provide some useful information, much could be done to improve them. Significant shortcomings in MSDS that the authors have found include the following:

MATERIAL SAFETY DATA SHEETS

1. **May not cover all hazards**
2. **May not list all chemical ingredients**
3. **May not be prepared by persons with the right background.**
4. **May contain mistakes or contradictions**
5. **May not contain useful explanatory information**

(A separate but common problem:)

6. **Information may be misinterpreted by users**

1. THE MSDS MAY NOT COVER ALL HAZARDS.

Manufacturers and importers of chemicals are directed by OSHA to evaluate those chemicals and determine if they are hazardous. The manufacturers and importers do not have to test the chemicals themselves - they can rely on information that has already been published. However, most chemicals have not been adequately tested to determine their health hazard potential, especially for chronic health effects. Therefore, **the published literature is incomplete.**

Regular updates to MSDS are not required. Companies preparing MSDS are required to update an MSDS within three months only if they become newly aware of any significant information regarding the hazards of a chemical or ways to protect against the hazards.

Manufacturers / importers are not required to include information on the MSDS about the ecological effects of a product, although some companies do include environmental effects voluntarily.

Manufacturers and importers of mixtures are not required by OSHA to test mixtures for health hazards. If studies have not been done on the mixture, manufacturers/importers can rely on published

health information about the individual chemicals in the mixture. However, effects from exposure to the mixture itself could be different than those due to exposure to its chemical components.

The MSDS must include hazard information for chemicals that make up 1% or more of the mixture (or 0.1% if the chemical is a carcinogen). A 1994 amendment to the OSHA Hazard Communication Standard clarified that a chemical in a mixture below the 1% or 0.1% cutoff must also be included on the MSDS when the manufacturer determines that it could present a health risk to employees. **MSDS which have not been updated since this 1994 ruling would not contain this additional information.** It is not known if all manufacturers are now in compliance with this requirement.

Cumulative effects due to small amounts of similar chemicals may not be shown on the MSDS. A mixture that contains several chemicals with similar effects (e.g., solvents), where each chemical is less than 1% of the mixture, may present a hazard which is not discussed in the MSDS.

2. THE MSDS MAY NOT LIST ALL CHEMICAL INGREDIENTS.

The manufacturer may claim the identity of a chemical as a trade secret. The hazards associated with a trade secret chemical still have to be included on the MSDS. However, without its chemical name, the employee will not be able to find additional information about the chemical in an ingredient guide, on the Internet or at the library.

Chemicals that make up less than 1% (or 0.1% for carcinogens) of a mixture are listed on the MSDS when the manufacturer has evidence that the chemical could present a health risk to employees in those lower concentrations. Chronic health risk studies on exposure to small amounts of product over time are not available for many chemicals. As a result, some chemicals with chronic health effects at low concentrations are not likely to appear on the MSDS.

3. MSDS MAY BE PREPARED BY PERSON(S) WITHOUT THE APPROPRIATE BACKGROUND.

There are no OSHA requirements for the education or training of the person(s) who prepare the MSDS. It has been the experience of the authors and reviewers of this report that in-house technical staff or consultants hired by the company typically write the MSDS. However, there is no requirement that MSDS writers have expertise in toxicology, industrial hygiene, or medicine, or that they are able to interpret the significance of animal or human study data.

4. SOME MSDS CONTAIN MISTAKES OR CONTRADICTIONS.

OSHA is aware that there are MSDS which contain inaccurate or insufficient information (Hazard Communication Standard final rulemaking, February 9, 1994, 59 FR page 6163-6164). For example,

the MSDS may indicate that a product is not hazardous. Yet under the precautionary measures, it is suggested that if the product gets on the skin, it must be washed off immediately. OSHA believes that the adequacy of MSDS information also needs to be improved. For example, an MSDS may say that the product "may cause chronic health effects" without giving the user any specifics. The authors have found that key information, like pH, is sometimes marked "not available."

5. MSDS MAY NOT CONTAIN USEFUL EXPLANATORY INFORMATION.

The language of the MSDS may be too technical. For example, medical terms may be used that are meaningless to someone without a medical degree.

6. MSDS INFORMATION MAY BE MISINTERPRETED BY USERS.

Employees and safety personnel may misinterpret the information on an MSDS, causing misleading assumptions and resulting in work practices that are not adequately protective. For example, a safety manager may look at a high oral LD50 (lethal dose that will kill 50% of lab animals exposed to it) and think it means that the product is "safe," even though the product may also be capable of causing a reproductive effect like testicular atrophy with repeated exposure.

SUGGESTIONS FOR OVERCOMING THESE MSDS SHORTCOMINGS:

Knowing that MSDS's have problems, what can be done to evaluate the hazards of current products and select environmentally preferable products?

The first step is survey all the products in the workplace.

Read both the product label and the MSDS for each product, and compare the chemicals named in each. The label will list more ingredients than the MSDS. Look for warning statements on the label, such as "CAUTION," "WARNING," and "DANGER." Manufacturers of pesticides (including antibacterial cleaners and disinfectants) that are toxic to human beings are required by law to include one of these words on the label. However, these words do not have to be on the MSDS. Other indicator words to look for on the label:

CORROSIVE Flammable Combustible POISON

Vapor Harmful Absorbed through Skin Causes Burns

These or similar words are required to identify the principal hazard(s) in consumer products under the Federal Hazardous Substances Act.

Call the manufacturer and ask for crucial information about the product that is not provided on the MSDS, such as pH, or percentage of ingredients named on the label but not on the MSDS, and Chemical Abstract Services (CAS) number for any ingredient for which you want more information. The CAS number is the key to locating information about a chemical. Also look for contradictory statements on the label and MSDS and ask the company about them.

Use an ingredient guide like the one in Appendix B of this report to identify hazards associated with chemicals on the label and on the MSDS. Information in an ingredient guide should be compiled from a variety of recognized medical and toxicological sources. These sources are available at large public and most medical libraries. Some information is available online at sites like the Environmental Defense Fund's Scorecard website - http://www.scorecard.org/chemical-profiles.

Be wary of advertising terms, like "non-toxic," that aren't defined by government regulations. According to the Federal Trade Commission, terms like "environmentally friendly" and "environmentally safe" must have clear and prominent qualifying language that explains how the product is safer or better for the environment. Always look for information on the label, MSDS, in product literature and in the ingredient guide which can support these broad claims. If adequate explanatory information isn't given, call the manufacturer. If the manufacturer does not provide specifics, then shop elsewhere. For more information on evaluating "green" labeling claims, visit the Federal Trade Commission's web site at: www.ftc.gov/bcp/grnrule/guide980427.htm.

Be cautious of the term "biodegradable." All organic products will biodegrade eventually. The key is that the all the ingredients in a product should be readily biodegradable in a short amount of time. Ask the manufacturer to explain what they mean by "biodegradable." Remember: a disinfectant will kill the microorganisms responsible for biodegradation. For this reason, limit the use of disinfectants.

After identifying the chemicals in the workplace and their hazards, you should decide on the level of commitment your organization has to environmentally preferable purchasing. You can select products that are somewhat better than commonly used cleaning products. For example, you could decide to use only products which do not have the terms "DANGER" or "WARNING" on the label, and do not contain phosphates. Or you could decide to go as "green" as the marketplace can give you, which is what the parks and the Santa Monica city government have tried to do. There are shades of "green" between these two approaches.

If purchasing for a large organization with the resources to screen cleaning products, you could use the bid specifications for environmentally preferable janitorial products developed by the City

of Santa Monica [see Appendix E]. At the time of this report, Santa Monica had implemented the most comprehensive bid specifications in the United States, based upon the knowledge and experience of the authors.

For example, Santa Monica requires the submission of certain important information about the product. If that information is not provided, the product is not considered further. In addition to the required information, the city's bid specifications ask for information on other desirable environmental and health attributes. These bid specifications could be supplemented with additional requirements of special importance to any agency or location. However, avoid adding specifications that require costly tests. Expensive testing requirements would eliminate smaller companies from bidding. Some small companies have been leaders in developing environmentally preferable cleaning products.

If adopting a screening process, it is important that the bid process disqualifies vendors who do not submit complete information in a "required" category. In addition, vendors whose response in a relative ranking section is incomplete should receive the lowest score for that section. These steps will put the burden on the manufacturer to fully disclose the information needed for an evaluation.

APPENDIX D

Products Used at Yellowstone and Grand Teton National Parks

Products Used at Yellowstone and Grand Teton National Parks

As of the end of this project, Yellowstone National Park was using the following cleaning products. Many of these products have been used by the City of Santa Monica in their janitorial operations.

General Cleaning Products Used Throughout Yellowstone:

- Air freshener - plant-based deodorizer. Used for deodorizing restrooms and masking odors.
- All purpose cleaner - a pH neutral, biodegradable concentrated cleaner made from plants. Works in cold water. Used for floors, surfaces, walls and spotting.
- Bathroom cleaner - two products, both made from renewable resources. One is acid free. The other is made from food grade citric acid and has a pH of 2.5. Used for sinks, bowls, and showers.
- Bowl cleaner - a mildly acidic citric cleaner for routine use to dissolve mineral deposits, and as a back-up for the bathroom cleaner.
- Degreaser cleaner - contains plant-based solvents, wetting agents and alkaline detergents. (pH = 9.5) Dilutes with water. Used for automotive, industrial and kitchen soils or oils.
- Disinfectant - a quaternary ammonium chloride disinfectant. Used for disinfecting specific areas such as toilets.
- Enzyme stain treatment - made from natural enzymes and vegetable-based surfactants. Used for floors around urinals, and wherever organic matter is a problem.
- Furniture polish - Used for furniture and log cleaning and polishing. Free of petroleum solvents and volatile organic compounds (VOC's). Nozinc or wax.
- Glass and window cleaner - biodegradable, contains no fuming solvents, butyl ethers, ammonia or denatured alcohol. Used for glass, display cases and windows.
- Liquid hand soap - a plant-based soap that works with hot or cold water. Used in metal hand soap dispensers.

Specialized Cleaning Products Used in Limited Applications:

Note: the products in bold type do not meet the Santa Monica specifications.

- **Degreaser** - contains petroleum distillates. Used for toughest degreasing on shop floors.
- **Delimer / Descaler** - contains phosphoric acid. Stronger than general use product. Used for cases of extreme heavy buildups of lime or scale.
- Drain and septic treatment - Vegetable-based product, with bacterial enzymes. Used for cleaning drain lines, digesting organic matter over a period of days, and for longer lasting odor control in areas such as garbage cans and around urinals.
- Floor finish - used for floor care needs.
- Floor stripper - stripper/cleaner; dilute with water. Does not contain corrosives, caustics, ammonia or 2-butoxy-ethanol.
- **Graffiti remover** - has 70% plant-based ingredients. Contains some petroleum distillates (no carcinogens, mutagens or teratogens). Removes graffiti on hard surfaces such as signs, rocks, painted walls, etc.
- Natural solvent spotter - Vegetable-based cleaner. Used for removing gum, goo, tar, grease and adhesives.
- Oven cleaner - pH of 10.5. Used occasionally in employee housing. Used by one of the Yellowstone concessionaires in their kitchens.

Cleaning Products used at Grand Teton National Park:

Note: the product in bold type does not meet the Santa Monica specifications.

Air freshener
All purpose cleaner
Bathroom cleaner
Delimer / Descaler
Drain and septic treatment
Enzyme stain treatment
Furniture polish
Glass and window cleaner
Laundry detergent
Liquid hand soap
Carpet extraction - cleaner, deodorizer and grease emulsifier; dilute with water

APPENDIX E
City of Santa Monica Bid Specifications

If you have questions about the City of Santa Monica's bid specifications, you may call:

Sandy Schubert, Environmental Analyst
Environmental Programs Division
City of Santa Monica
200 Santa Monica Pier, Suite 1
Santa Monica, CA 90401-3126
sandy-schubert@ci.santa-monica.ca.us
(310) 458-2255

City of Santa Monica
Custodial Products Bid Specifications
1998

Introduction

The City of Santa Monica has updated the procurement process for custodial/ maintenance products allowing the City to better evaluate the overall worker health and environmental impacts associated with their use. This program is consistent with and integral to Santa Monica's Sustainable City Program. For each product submitted for consideration, the vendor must complete a Product Reporting Form (see below) with appropriate back-up documentation attached by staple in the upper left corner. Documentation for training can be submitted as a separate attachment. Please find enclosed the following materials:

I. General Guidelines
   - A. Documentation Guidelines
   - B. Product categories requested in the bid
   - C. Product performance testing program
   - D. Product specification description

II. Reporting Form Instructions
   - A. Pass-Fail Section
   - B. Relative Ranking Section

III. Reporting Forms
   - A. Custodial Product Reporting Forms
   - B. Employee Training Form
   - C. Other Attributes Form

The City encourages you to participate in this innovative opportunity to help safeguard the health of our employees, the community, and the environment.

An informational bidder's conference is scheduled to be held on — at –. All Bidders are strongly urged to attend this meeting.

I General Guidelines

A) Documentation Guidelines

When submitting documents to the City of Santa Monica, vendors are required to comply with the following guidelines:

* All copies shall be printed on recycled and/or tree free paper.
* All copies shall be double-sided.
* Report covers or binders shall be recyclable, use of plastic covers or dividers should be avoided.
* Unnecessary attachments or documents not specifically asked for should not be submitted. Avoid superfluous use of paper (e.g. separate title sheets or chapter dividers).

These guidelines were developed as part of Santa Monica's Sustainable City Program to promote waste reduction and resource conservation within the community. Thank you for your cooperation in this important effort.

B) Product categories:

The following is a list of product categories the City requires for custodial purposes. Each product submitted must be identified with one of these categories.

All Purpose Cleaner
Bathroom Cleaner
Lime and Scale Remover
Degreaser/Cleaner
Furniture Polish
Graffiti Remover
Floor Finish
Floor Stripper
Wood Floor wax/cleaner
Glass and Window Cleaner
Deodorizer
Liquid Hand Soap
Carpet Shampoo (rotary brush)
Chrome Polish/Cleaner
Brass Polish/Cleaner
Disinfectant
Enzymatic Cleaner/Degreaser
Solvent Spotter/Gum Remover

It is desirable that vendors be able to supply the greatest number of products listed above meeting the health and environmental specifications. Vendors of single products are encouraged to partner with other manufacturers or distributors to maximize the City's administrative convenience.

C) Product Performance Testing:

After the products in each category have been assigned a point score, the City will determine the number of most favorably scored products to be tested for their performance. The City will request samples from the supplier, from 3 one pint bottles up to 3 one gallon bottles depending on the application. City custodians will test each of the products on the job and will rank each product according to its performance. City staff will use this ranking to make a short list from which to evaluate the cost consideration and administrative convenience of the product or product line. Those products which rate the most favorably will be approved for purchase by all City departments.

D) Product Specification Description:

The City has compiled a set of specifications (see below) that will be used to evaluate the environmental and health impacts of various cleaning products which the City will be considering for purchase. The specifications require the supplier to submit a wide range of specific information regarding such elements as product chemical characteristics, packaging, and training capabilities. The specifications are divided into two groups: 1)mandatory or pass/fail, and 2)relative ranking. **It is the responsibility of the bidder to make sure that <u>all</u> the requested information is included in the submitted bid package.**

Pass-Fail Section: Products which do not meet the mandatory specifications or for which the appropriate information has not been submitted will be disqualified from further consideration.

Relative ranking specifications: The information submitted by the bidder will be used to assign a point value for each specification for purposes of calculating a cumulative score for each product. The greater the point score the more favorable the product. If any information in the relative ranking section is missing or incomplete the product will be assigned the least favorable score for that specification. For example, if no documentation is submitted on the product's pH, the product will receive 0 points for that specification. Products will be compared within an individual product category (i.e. floor strippers, glass/window cleaners).

Reporting Forms: These forms must be copied by the vendor and submitted for each product under consideration. The Training and Other Attribute forms do not have to be duplicated for each product category, a single copy of each is all that is required from each vendor.

II. Reporting Form Instructions

When one product is intended for use in more than one product category:
If a single product fulfills more than one category (i.e. can serve as a glass cleaner and as an all purpose cleaner for walls etc.) then all appropriate categories should be listed on the top of the Product Reporting Form. One set of Product Reporting Forms and associated back-up documentation should be submitted in the bid package for a product that meets several categories.

Proprietary Information
The City is requesting full disclosure of all contents including both inert and active ingredients in the proposed products. Any and all information submitted to the City for purposes of rating the acceptability of a proposed product shall be treated as proprietary and maintained in the strictest confidence.

A) Pass Fail Section:

Please note that failure to meet the standards of any of the pass-fail criteria listed below will lead to the automatic rejection of that product. In addition, failure to submit responses to any pass-fail criteria will render your bid for that product as "unresponsive" and lead to the rejection of that product.

1. SARA Title III, Sect. 313
No ingredient shall require reporting under EPA's Superfund Amendments and Re-authorization Act (SARA Title III, Section 313). The ingredients requiring reporting under this act represent some of the most acutely toxic chemicals used in cleaning products. The City believes that these aggressive chemicals are no longer required in most cleaning product categories and seeks to protect the health of its workers by minimizing exposure to the chemicals. **Floor care products and metal polishes are exempted from this mandatory criteria.**

Acceptable response - If all ingredients over trace amounts are not listed on the msds than a certification from the product manufacturer will be required

2. Disinfectants in cleaners
No cleaners shall contain disinfectants. Because proper/adequate disinfection of a surface requires that the surface be cleaned prior to disinfecting, the City wishes to separate out the cleaning and disinfecting processes. Eliminating disinfectants from all purpose, bathroom and floor cleaners will reduce the toxicity of these products and will reduce the amount of disinfectant chemicals used in City operations. A separate product category for disinfectants is included separate from cleaners.

Acceptable response - if all ingredients over trace amounts are not listed on the msds then a certification from the product manufacturer will be required

3. Aerosol cans

No products shall be delivered in aerosol cans. The City believes that no aerosol container can be considered truly empty of product and propellant. Recycling such partially filled aerosol cans is extremely expensive and requires specially handling by hazardous waste technicians. All product categories must be available in a non-aerosol formulation such as ready-to-use pump action sprays, air-charged refillable containers, or concentrates that can be dispensed into spray bottles for use.

Acceptable response - description of delivery system

4. Carcinogens, Mutagens, Teratogens

No ingredients can be classified as known or probable carcinogens, teratogens, or mutagens on any of the following lists:

a. California Safe Drinking Water And Toxic Enforcement Act of 1986 (Prop. 65), CCR Title 22, Division 2, Subdivision 1, Chapter 3 Section 12000 et seq.)

b. National Toxicology Program (NTP)

c. International Agency for Research on Cancer (IARC), Group 1, 2A or 2B

d. Occupational Safety and Health Administration (OSHA) regulated carcinogen

While ingredients listed in the above documents are rare in today's cleaning product formulations, the City wishes to eliminate them entirely from the products which are purchased for use in City operations. Such chronic toxins are no longer necessary for the efficacy of current cleaning technologies.

Acceptable response - reference on msds or certification by product manufacturer. (Note all the above lists must be addressed in your response)

5. APE's

No products shall contain Alkyl phenyl ethoxylates (APE's) above trace amounts. The City recognizes the potential danger to wildlife and humans when hormonal mimics, such as APE's are released into water systems. Further, the persistence of the break down products of APE's make the issue of bio-accumulation a special concern and are not consistent with the requirement for ready biodegradability.

Acceptable response - if all ingredients over trace amounts are not listed on the msds then a certification from the product manufacturer will be required

6. Ozone Depleting Compounds

No products shall contain ozone depleting chlorinated compounds. Section 5600-5609 of the Santa Monica Municipal Code bans the use and sale of products containing chlorinated fluorocarbons.

Acceptable response - if all ingredients over trace amounts are not listed on the msds than a certification from the product manufacturer will be required

7. VOC's

Products must meet or exceed the California Code of Regulations (Article 2 Section 94509, Title 17) maximum allowable Volatile Organic Compound (VOC) levels for appropriate cleaning product categories. Because of concerns over air quality, the State of California regulates the VOC levels of various consumer products. The City wishes to extend these thresholds to all industrial use cleaning products.

Acceptable response - VOC levels must be stated as a percent of VOC by weight at the minimum recommended dilution and at the concentrate level. The dilution at which the %VOC content was calculated must be submitted (i.e. at 50% dilution, %VOC was 5%, at concentrate, %VOC was 8%). Note: For the bid to be accepted, VOC levels must be reported in units of %, not in grams per liter.

Appropriate test methods and legal limits can be found in the California Code of Regulations, Title 17. Contact the State of California's Air Resources Board for further clarification if needed (916) 327-1503.

8. Biodegradability

All surfactants and other organic chemical ingredients must meet the Organization for Economic Cooperation and Development (OECD) definition of Readily Biodegradable. The City wishes to protect the ocean habitat which supports the local economy and quality of life for residents and, therefore, is concerned with the environmental fate of chemicals used in City operations.

Acceptable response - independent lab results achieving the following parameters on one of the following tests:

DOC Die-Away Test	60% Theoretical CO_2 Evolution
MITI I Test	60% Theoretical Oxygen Demand
Closed Bottle Test	60% Theoretical Oxygen Demand
CO2 Evolution Test	60% Theoretical CO_2 Evolution
Modified OECD Screening Test	70% Dissolved Organic Carbon
Manimetric Respirometry Test	60% Theoretical Oxygen Demand

These values must be met within 10 days of reaching 10% and must also be met within 28 days of the beginning of the test.

Requirements for simulation tests as substitutes for the above tests are available from the OECD or the EPA. The acceptability of these other tests will be decided on a case-by-case basis.

NOTE: For disinfectants, the biocide ingredient is exempt from this criteria.

B) Relative Ranking Section:

Because a single set of criteria can not be developed for all product categories the following characteristics will be judged on a relative ranking basis. Point scores will be assigned to each criteria that are reflective of the City's priorities concerning protection of human health and that of the environment. The higher the score the more favorable the evaluation. If no documentation is included in the bid packet to address a criteria, the product will be automatically awarded the lowest or least favorable score for that criteria.

Again, the criteria relate to either whole product or each individual ingredient present in greater than trace amounts in the concentrate formulation (formulation as delivered to the City).

9. Lethal Doses
As defined by the California Code of Regulations, Chapter 11, Article 3, Section 66261.24:

Whole product LD_{50}(oral) prefer > 5,000 mg/kg.
Whole product LD_{50} (skin) prefer > 4,300 mg/kg
Whole product LC_{50} (inhalation) prefer > 10,000 parts per million

If no whole product data is available then data must be provided for each ingredient present in the concentrate in over trace amounts. While such lethal dose values do not always translate neatly from animal to human systems, the City believes that they provide a readily accessible means of comparing the acute toxicity of various products. By selecting products with higher lethal dose levels, the City will better safeguard the health of workers coming in daily contact with these chemicals.

Acceptable response -	reference on msds or certification by product manufacturer or independent lab.

10. Product pH

Identify the pH of the whole product in concentrate form. The City is concerned over the exposure of City Staff to potentially corrosive chemicals and wishes to reduce the likelihood of on-the job injury.

Acceptable response - msds or certification from manufacturer

11. Skin Irritation Index

Identify the primary dermal irritation index (PDII) for whole product when possible, and in concentrate form. The City is concerned over the exposure of City Staff to potentially irritating chemicals and wishes to reduce exposure.

Acceptable responses:

A. Animal Testing

1). US Department of Transportation, 49CFR173.240

2). US EPA Acute Toxicity Testing Criteria for New Chemical Substances, Office of Toxic Substances EPA Document 560/13-79-009

3). US CPSC, Federal Hazardous Substance Act Regulations, 16CFR1500.41

4). OECD Guidelines for Testing Chemicals, Section 404, "Acute dermal irritation/corrosion." Organisation for Economic Cooperation and Development, 1981.

Human tests for skin irritation using the same index as is routine for animal tests (primary dermal irritation index) are generally acceptable. If these tests were performed for the manufacturer or by any entity connected with the manufacturer a copy of the original written Assurance that all testing was conducted in compliance with the regulations set forth in 45CFR46 regarding consent of human subjects must be provided.

B). Non-Animal Testing

Because there is no standard in vitro test for skin irritation which has proven to predict irritation for all substances, in vitro tests predicting skin irritation will be reviewed on a case-by-case basis. For these tests to be accepted they must be referenced in peer-reviewed literature and the exact laboratory procedure, if it differs from the published procedure, must be described. Documentation supporting the choice of the particular test and why it is the best one to use for this particular product or ingredient must be included or referenced.

Single ingredient testing is acceptable as long as it is submitted for ALL ingredients. If one ingredient is an irritant when tested singly but does not act as one in the product, a skin irritation test confirming this or a substantiated technical explanation showing the mechanism of action and reason for assumption of non-irritancy is required for points to be earned.

12. Eye Irritation:

Irritation scores should be for whole product when possible, and in the concentrate form. The City is concerned over the exposure of City Staff to potentially irritating chemicals and wishes to reduce exposure.

Acceptable responses - Numerical scores or descriptive classification scale (described in the NAS publication "Principles and procedures for evaluating the toxicity of household substances") for severity of ocular lesions in the cornea, iris, and conjunctivae for this product or for each ingredient using one of the following test methods:

A) Animal Testing

1). J.H. Draize, G. Woodard and H.O. Calvery, `Method for the study of irritation and toxicity of substances applied topically to the skin and mucous membranes.' J. Pharmacol.Exp.Ther., 1944, v. 82, pp. 337-390.

2). US EPA Acute Toxicity Testing Criteria for New Chemical Substances, Office of Toxic Substances EPA Document 560/13-79-009

3). US CPSC, Federal Hazardous Substance Act Regulations, 16CFR1500.42

4). OECD Guidelines for Testing Chemicals, Section 404, "Acute dermal irritation/corrosion." Organisation for Economic Cooperation and Development, 1981.

5). US Intra-agency Regulatory Liaison Group, `Testing Standards and Guidelines Working Group, Recommended Guidelines,' 1981.

6). National Research Council (US) Committee on Toxicology, `Principles and procedures for evaluating the toxicity of household substances,' (#1138) Washington, DC, 1964.

B) Non Animal Testing: see for dermal irritation.

Single ingredient testing: see dermal irritation.

13. Flash Point

Identify the flash point (in degrees Fahrenheit) of the product concentrate using any method outlined in Department of Transportation regulations CFR 173.120. Chemicals are stored and used in a wide variety of circumstances. To protect against potential fire hazards, the City prefers chemicals with a higher flash point.

Acceptable Response: msds or certification from independent lab. The answer of "none" is not acceptable.

14. Dyes
Identify all added dyes and state whether or note they are considered food-grade. The City considers the addition of dye and fragrances superfluous to product performance and recognizes the potential hazard associated with some of these additives. The City prefers that product identification for users be through a clear labeling system rather than by chemical additives.

Acceptable response - msds or certification from manufacturer

15. Added Fragrances
Identify any added fragrances and state whether or note they are considered food-grade. (Note: does not include the natural fragrance that may result from active ingredients). See Dyes criteria for justification.

Acceptable response - msds or certification from manufacturer

16. % VOC's
List whole product %VOC for product concentrate and minimum recommended dilution. See pass/fail section for guidance. Because of the unique air quality concerns of the Los Angeles air basin, and the link between VOC's and air pollution, the City wishes to purchase products with the lowest VOC levels possible.

17. Dilution range
List the range of relevant dilutions for this product from heavy duty cleaning to daily use. (i.e. heavy duty cleaning use full strength, daily use dilute 1 part product to 5 parts water). To reduce the amount of packaging consumed by City Operations, the City wishes to purchase the most concentrated formulations available for each product category.

18. Product Container Material
Identify the type of material used in construction of the product container. If plastic, list the numbered type of plastic (i.e. #1-7). The City wishes to maximize its recycling opportunities by purchasing plastics of the types #1-5.

19. Aquatic Toxicity
Provide a measure of the aquatic toxicity for the product or its ingredients. The City is situated adjacent to the Santa Monica Bay and seeks to protect this habitat from potential environmental toxicants.

Acceptable measures include EC_{50}: Daphnia, fish, or algae. Include certification letter from independent lab listing values and test used.

UPB

20. Employee Training

The City believes that an effective training program is central to the success of using environmentally preferable products. The City will look for vendors who can supply a quality training effort and be accessible to trouble shoot problem applications.

Describe the level of employee training available to City and contract staff regarding the use of your products. Complete section entitled "Employee Training" once. A separate form is not required for each product submitted for consideration.

In order to receive points for this criterion, bidders must complete the questions listed on the Training Information Form. If this form is not included or is left blank, a score of 0 points for this criterion will be awarded to each product submitted for consideration. Only a single copy of this information is necessary, attach additional sheets if needed.

21. Other Attributes

The City recognizes that there may be attributes of the product that will help to assess environmental preferability other than the ones listed in these specifications. For example, equipment or a specific tool may be available from your company that improves the efficacy of the product and so helps to replace the need for aggressive chemicals. Another example might be an effective labeling program for refillable squirt bottles that will help the user to identify the product on a shelf and so make the use of dyes or other additives unnecessary. In addition, your company may be participating in noteworthy community additives around habitat preservation or environmental justice. Or perhaps your manufacturing facility has an exemplary energy/water efficiency design or a waste reduction program.

Identify any other attributes of the product or manufacturer that may assist in the evaluation of the environmental preferability of your bid. No specific point value will be awarded to this information. The use of this information will be at the discretion of the evaluation committee acting on behalf of the City of Santa Monica. Complete section entitled "Other Environmental Attributes" only once, a separate form is not required for each product submitted for consideration. Relevant attachments may be stapled to this form.

Custodial Product Reporting Form

(Make copies of this form for each product, attach back-up documentation by staple in upper left corner.)

Product Name _____ Product Category _____

PASS/FAIL SECTION		
CRITERIA	RESPONSE	BACK-UP DOCUMENTATION
1. SARA Title III, Sect. 313	☐ no ingredient requires reporting	☐ msds ☐ other_____
2. Disinfectants in cleaners	☐ does not contain	☐ msds ☐ other_____
3. Aerosol Cans	☐ product not delivered in aerosol can	☐ msds ☐ other_____
4. Carcinogens, Mutagens, Teratogens	no ingredient is present in greater than trace amounts under: Prop. 65 ____ NTP____ IARC ____ OSHA____	☐ msds ☐ other_____
5. APEO's	☐ does not contain	☐ msds ☐ other_____
6. Ozone Depleting Compounds	☐ does not contain	☐ msds ☐ other_____
7. VOC's	%VOC _____ @ minimum dilution of __ : 1 or ☐ concentrate note: if product is ever used full strength, must use VOC value for the concentrate	☐ msds ☐ other_____
8. Biodegradability	☐ meets OECD definition of Ready Ultimate Biodegradability	☐ msds ☐ other_____

Custodial Product Reporting Form

(Make copies of this form for each product, attach back-up documentation by staple in upper left corner.)

Product Name _____ Product Category _____

RELATIVE RANKING SECTION		
CRITERIA	**RESPONSE**	**BACK-UP DOCUMENTATION**
9. Lethal Doses (10 pts)	LD_{50} oral = _____ and/or LD_{50} dermal = _____ and/or LC_{50} inhalation = _____	☐ msds ☐ other_____
10. Product pH (10 pts)	_____ = pH of concentrate	☐ msds ☐ other_____
11. Skin Irritation Index (5 pts) (For non-animal testing see specifications section)	value = _____ ☐ whole product ☐ single ingredient(s) (please list as attachment) test used _____	☐ msds ☐ other_____
12. Eye Irritation (5 pts) (For non-animal testing see specifications section)	value = _____ ☐ whole product ☐ single ingredient(s) (please list as attachment) test used _____	☐ msds ☐ other_____
13. Flash Point (5 pts)	____°F	☐ msds ☐ other_____
14. Dyes (5 pts)	☐ none ☐ food grade	☐ msds ☐ other_____
15. Added Fragrances (5 pts)	☐ none ☐ food grade	☐ msds ☐ other_____
16. % VOC's (10 pts)	___% @ concentrate ___% @ min. dilution	☐ msds ☐ other_____
17. Dilution range (10 pts)	heavy duty __:__ daily use __:__	☐ msds ☐ other_____
18. Product Container - material (5 pts)	plastic # _____ other _____	☐ msds ☐ other_____

RELATIVE RANKING SECTION		
19. Aquatic Toxicity (10 pts)	☐ whole product ☐ single ingredient(s) (please list as attachment) EC_{50} _____ Test Used_____ Type of Organism_____	☐ msds ☐ other_____
CRITERIA	**RESPONSE**	**BACK-UP DOCUMENTATION**
20. Training (15 pts)	☐ materials attached	written description only one copy per bid is required
21. Other Attributes (point value for discretionary use)	☐ materials attached	written description only one copy per bid is required

Employee Training Form

A. Vendor Name

B. Describe the training services available to City employees and contract custodial staff in the City of Santa Monica. Please address training goals, training methods, and the types of training proposed for various City custodians and supervisors.

C. Describe costs associated with different types of training, if any.

D. List personnel who would be available to conduct on site training and their experience in the company.

E. Provide a phone number for product questions and the hours calls will be answered:
Phone: _____ Hours _____

Other Attributes Form:

Complete as described above. Please limit written description to this page. Attachments may be stapled to the form.

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